AMERICAN UNIVERSITY OF BEIRUT

E-LEARNING PLATFORM FOR INTERACTIVE AND LEARNER-CENTERED EDUCATION

by
HAMZA MAHMOUD IBRAHIM

A project
submitted in partial fulfillment of the requirements
for the degree of Master of Arts
to the Department of Education
of the Faculty of Arts and Sciences
at the American University of Beirut

Beirut, Lebanon
April 2026

AMERICAN UNIVERSITY OF BEIRUT

E-LEARNING PLATFORM FOR INTERACTIVE AND LEARNER-CENTERED EDUCATION

by

HAMZA MAHMOUD IBRAHIM

Approved by:

Dr. Hoda Baytiyeh, Associate Professor Department of Education	First Reader
Dr. Saeed Raheel, Lecturer Department of Computer Science	Second Reader

Date of project defense: April 24, 2026

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to everyone who stood by me throughout the completion of this project.

First, I would like to sincerely thank my supervisors, Dr. Hoda Baytieh and Dr. Saeed Raheel, for their guidance, encouragement, and valuable support throughout this journey. Their advice and feedback played an important role in shaping this work.
My heartfelt thanks go to my beloved family, whose love and support gave me the strength to continue.

To my mother and father, no words can truly express my gratitude. Thank you for your endless sacrifices, your unconditional love, your prayers, and for always believing in me. Everything I achieve is built on the foundation you gave me.

To my brothers, thank you from the bottom of my heart. Your presence in my life has always been a source of strength, comfort, and encouragement. In moments of pressure and difficulty, knowing that I had you beside me made every challenge feel lighter. Your support was not only helpful, but deeply meaningful to me, and I will always be grateful for the bond we share.

To my beloved wife, thank you for your patience, understanding, and constant encouragement during this demanding period. Your support carried me through many difficult moments, and your presence gave me peace, motivation, and hope.
To my dear son, you have been a source of happiness, light, and inspiration in my life. Every smile from you reminded me why I should keep going and give my best.
And to my baby girl, whom we are lovingly waiting to welcome into this world, you are already a precious blessing in our lives. Even before your arrival, you have filled our hearts with joy, hope, and love. I dedicate this achievement to you as well.

Finally, to all those who supported me, encouraged me, and believed in me, thank you. This accomplishment is not mine alone, but a reflection of the love, strength, and support that surrounded me throughout this journey.

ABSTRACT
OF THE PROJECT OF

Hamza Mahmoud Ibrahim for Master of Arts
Major: Education

Title: E-Learning Platform For Interactive And Learner-Centered Education

The rapid expansion of online learning has broadened access to education while also revealing ongoing challenges related to student engagement and instructional quality. Many existing platforms prioritize content delivery but provide limited support for instructor presence and pedagogically grounded interaction. This project responds to this gap through the design and implementation of an adaptive e-learning platform informed by the Community of Inquiry framework, with a focus on strengthening teaching presence in online learning environments.

The project examines how platform design features such as instructor feedback mechanisms, course organization tools, and facilitation functions support instructional practices and learner engagement. Drawing on principles from Self-Determination Theory, Universal Design for Learning, and Cognitive Load Theory, the platform integrates personalized learning paths, interactive assessments, real-time communication tools, and instructor analytics.

A design-based methodology was adopted, involving iterative development and pilot testing supported by platform usage data and user feedback. The results suggest that structured course layouts and timely feedback tools enabled instructors to manage learning activities more effectively and reinforced their instructional presence. Learners reported greater clarity in course expectations, improved communication, and increased participation.

This project presents a theory-informed e-learning platform that demonstrates how adaptive design can support learner-centered instruction and enhance teaching presence. The findings offer practical implications for educators and institutions seeking to improve the quality of online teaching through pedagogically grounded digital environments.

TABLE OF CONTENT

ACKNOWLEDGEMENTS 1

ABSTRACT 2

ILLUSTRATIONS 6

TABLES 7

INTRODUCTION 8

Background of the Study: .....

Statement of the Problem: .....

Rationale of the Study: .....

Research Question and Purpose of the Project .....

Significance of the project: .....

Significance for teaching practice: .....

Significance for learners .....

Significance for educational institutions .....

Significance for educational policy: .....

Significance for educational technology development and research .....

LITERATURE REVIEW 17

Review of relevant literature about the subject globally, in the region, and in Lebanon: .....

The Community of Inquiry Framework: .....

Teaching Presence: Conceptual Foundations: .....

Teaching Presence and Engagement: .....
Measuring Teaching Presence: .....
Platform Design as an Enabler of Teaching Presence: .....
Comparison with established learning management systems .....
Supporting Theories for Design Decisions: .....
Regional Context: Middle East: .....
Lebanon Context: .....
Synthesis and research gap: .....
Conceptual framework of the study: .....
Chapter summary: .....
METHODOLOGY 39
Project Design .....
Rationale for Design-Based Research .....
Research Orientation .....
Design Principles Guiding the Platform .....
Iterative Development Process .....
Platform Features Implemented .....
Pilot implementation context .....
Ethical considerations .....
Summary of Research Design .....
Context of the Project .....
Platform Workflow .....
Project implementation procedures and products generated .....
FINDINGS AND DISCUSSION 56

Introduction.....

Outcomes of the project implementation.....

Enhanced Course Organization and Instructional Clarity .....
Increased Visibility of Instructor Guidance.....
Improved Facilitation of Interaction and Discourse .....
Increased Instructor Awareness Through Learning Analytics .....
Workflow Efficiency and Reduced Instructional Fragmentation .....
Student Perceptions of Clarity, Support, and Engagement.....
Adaptive Features and Personalized Learning Navigation.....
Summary of Implementation Outcomes .....

Discussion of the findings.....

Teaching presence as an organizing structure .....

Instructional clarity and cognitive load reduction .....

Visibility of guidance and direct instruction.....

Facilitation of discourse and meaningful interaction.....

Instructor awareness and data-informed guidance.....

CONCLUSIONS 73

Summary of findings .....

Limitations of the Project .....

Recommendations.....

REFERENCES 81

ILLUSTRATIONS

Figure

1. *Conceptual Framework Of The Study Linking Platform Design Features, Teaching Presence, And Instructional Outcomes*. 36

2. *E-Learning Workflow: From Student Engagement To Analytics-Driven Instruction* **.** 49

3. *This Page Allows Instructors To Create Assignments By Entering The Title, Course, Dates, Time, And Description.* ..... **Error! Bookmark not defined.**

4. *This Page Enables Learners To Submit Topic-Based Questions With A Title And Detailed Description.* ..... **Error! Bookmark not defined.**

5. *This Interface Supports Interactive Communication Through Question-Based Discussion And Replies.* ..... **Error! Bookmark not defined.**

TABLES

Table

1. *Comparative Analysis Of Conventional Lmss And A Teaching-Presence-Centered Platform* 30

2. *Summary Of Instructional Improvements Observed During Platform Implementation* 64

3.*Platform Features Supporting Teaching Presence Dimensions* 65

CHAPTER 1

INTRODUCTION

Background of the Study:

Over the past decade, online and blended learning have become integral components of education worldwide. Advances in digital technology, along with increasing demand for flexible learning opportunities, have accelerated the adoption of virtual classrooms across higher education and K–12 contexts. More recently, global disruptions have further underscored the importance of reliable platforms capable of supporting teaching and learning in digital environments.

Despite this growth, many online learning systems continue to replicate traditional classroom practices in limited ways, emphasizing content delivery through documents, recorded lectures, and isolated activities, with relatively little attention to interaction or engagement. While such approaches improve access to learning materials, they do not consistently promote active learning or sustained instructor involvement.

Educational research emphasizes that effective online learning depends not only on technological infrastructure but also on pedagogically informed design. The Community of Inquiry framework identifies teaching presence, social presence, and cognitive presence as essential elements of meaningful online learning experiences. Among these, teaching presence plays a central role by shaping course organization, facilitating interaction, and providing instructional guidance. When teaching presence is limited or inconsistent, learners may feel disconnected from the learning process, and instructional quality may vary significantly across courses.

At the same time, learners enter online environments with diverse backgrounds, levels of preparedness, and access conditions. Instructors are therefore required to manage increasingly complex responsibilities, including organizing content, supporting learner motivation, ensuring accessibility, and monitoring engagement. In the absence of integrated systems that support these processes, educators often rely on fragmented tools and manual workflows, which can increase workload and reduce instructional effectiveness.

Within this context, there is a growing need for e-learning platforms that move beyond basic content management to actively support teaching presence through design. Adaptive technologies, learning analytics, and accessible interfaces offer opportunities to enhance instructional practices when aligned with established educational frameworks. This project responds to this need by developing an adaptive e-learning platform grounded in pedagogical theory and focused on strengthening teaching presence in online learning environments.

Statement of the Problem:

Online learning environments have expanded rapidly across higher education and K–12 settings, yet persistent challenges remain related to instructional quality, learner engagement, and student persistence. Although digital platforms provide flexibility and access, many learners report feelings of isolation and uncertainty regarding course expectations, while educators struggle to sustain meaningful interaction, monitor progress, and provide timely support. These challenges reflect deeper design limitations in how many e-learning platforms support teaching and learning processes.

In practice, numerous online systems continue to emphasize content delivery by organizing courses primarily around uploaded files, recorded lectures, and static modules. This approach often positions platforms as repositories rather than interactive learning environments, reducing the instructor's role to administrative tasks such as posting materials and grading assignments instead of active facilitation, guidance, and feedback. When instructional presence is limited, students may experience decreased motivation, weaker engagement, and lower persistence. Although research highlights the importance of sustained instructor involvement, many platforms provide only basic tools that do not adequately support this role.

While most learning management systems include features such as discussion forums and messaging tools, these components are frequently implemented in isolation and are not embedded within a coherent pedagogical framework. The Community of Inquiry (CoI) framework emphasizes that effective online learning environments depend on the integration of teaching presence, social presence, and cognitive presence. Among these, teaching presence plays a central role by shaping course design, facilitating discourse, and providing direct instruction. However, current platforms often lack structured workflows that help instructors organize learning pathways clearly, deliver consistent feedback, and guide interaction in purposeful ways. As a result, teaching presence depends largely on individual instructor effort rather than being supported systematically through platform design.

This gap becomes particularly evident in learning contexts characterized by diverse learner needs, varying levels of digital readiness, and limited instructional capacity. In such environments, maintaining consistent communication and identifying struggling students early require more than isolated tools; they demand integrated systems that

make instructional processes visible and manageable. Without mechanisms for transparent course organization, timely feedback, and meaningful learning analytics, instructional quality can become uneven, and students who begin to disengage may not receive appropriate support. These limitations contribute to fragmented learning experiences and reduce the effectiveness of online education.

Accordingly, the central problem addressed in this project is that many existing e-learning platforms do not adequately support teaching presence through integrated, pedagogically grounded design. Specifically, they lack coordinated tools for instructor feedback, course structuring, and facilitation supported by analytics that inform instructional decision-making. This design gap limits instructors' ability to actively guide learning and respond to student needs in real time.

In response to this challenge, this project focuses on the design and implementation of an adaptive e-learning platform grounded in the Community of Inquiry framework and informed by complementary theories, including Self-Determination Theory, Universal Design for Learning, and Cognitive Load Theory. By embedding these theoretical principles into the platform architecture, the project seeks to support instructors in maintaining teaching presence while promoting learner engagement and clarity.

Rationale of the Study:

Online learning has become a central component of contemporary education; however, many platforms continue to prioritize content delivery over instructional support. As schools and universities increasingly adopt digital and hybrid models, a critical challenge lies in ensuring that instructors are able to guide, support, and engage students effectively. Although current systems often provide basic communication and management tools, instructors frequently rely on fragmented resources and manual

processes to organize courses, provide feedback, and monitor learner progress. Addressing this gap is essential for improving both the effectiveness and equity of online education.

This project is grounded in the understanding that teaching presence plays a key role in shaping the quality of online learning experiences. Teaching presence refers to how instructors design learning activities, facilitate interaction, and provide direct guidance. In many existing platforms, these responsibilities are left largely to individual instructors rather than being supported through intentional system design. A platform that explicitly strengthens teaching presence can reduce instructional burden while promoting more consistent and structured learning environments.

While the Community of Inquiry framework serves as the primary theoretical lens for examining teaching presence, the platform design is informed by complementary learning theories. Self-Determination Theory guides motivational features by emphasizing autonomy, competence, and relatedness. Universal Design for Learning informs accessibility and flexibility to support diverse learners. Cognitive Load Theory shapes the presentation of instructional content to promote comprehension and retention. Together, these frameworks support the pedagogical design of the platform, while CoI provides the main framework for analyzing teaching presence.

From a practical perspective, this project seeks to provide instructors with tools that support online teaching in a more organized and responsive manner. Features such as structured course layouts, integrated feedback mechanisms, discussion facilitation tools, and learning analytics are intended to assist instructors in managing learning activities and identifying students who may require additional support. By consolidating these elements within a single platform, the project aims to move online learning beyond

passive content consumption toward a more guided and interactive experience, while supporting institutional efforts to improve teaching quality without increasing instructor workload.

This work is particularly relevant in educational contexts characterized by varied learner readiness and limited instructional resources. Embedding teaching presence into platform design offers a pathway toward more consistent, learner-centered digital classrooms. Additionally, the project reflects an interdisciplinary approach that connects computer science with educational practice, demonstrating how technology development can be guided by evidence-based pedagogical frameworks.

Research Question and Purpose of the Project

This project examines how an adaptive e-learning platform can be designed to support online teaching, with particular attention to strengthening teaching presence. Within the Community of Inquiry framework, teaching presence refers to instructional design, facilitation of learning activities, and direct guidance provided to learners.

The guiding research question for this project is:

1. How can an adaptive e-learning platform be designed to enhance teaching presence in online learning environments?

The purpose of this project is to design, implement, and evaluate an adaptive e-learning platform that provides instructors with practical tools for feedback, course organization, facilitation, and learning analytics. The development approach integrates educational theory with technological design, using the Community of Inquiry framework as the primary lens for examining teaching presence, while drawing on Self-Determination Theory, Universal Design for Learning, and Cognitive Load Theory to inform features that support learner motivation, accessibility, and effective content presentation.

A pilot implementation is conducted to explore how instructors interact with the platform and how its design supports instructional practices. Data gathered through platform analytics and user feedback are used to document system usability and instructional engagement. The project does not seek to measure direct learning outcomes; rather, it focuses on understanding how intentional platform design can contribute to more structured, interactive, and effective online teaching.

Overall, the project contributes both a functional e-learning platform and practical insights into how digital learning environments can be designed to support instructors in delivering responsive, organized, and learner-centered instruction.

Significance of the project:

This project addresses a central gap in online education: the limited support for teaching presence within many digital learning platforms. As digital and hybrid learning models continue to expand, instructors increasingly require systems that help them maintain consistent communication, guide learning activities, and support student engagement. By embedding teaching presence into platform design, this project offers both a practical technological solution and insights into improving the quality of online instruction.

Significance for teaching practice:

The platform provides instructors with structured tools that support course design, facilitation, and feedback. Features such as organized course layouts, integrated feedback mechanisms, discussion facilitation tools, and learning analytics enable educators to manage online courses more effectively, monitor engagement, and identify students who may require additional support. By reducing reliance on fragmented systems, the platform supports clearer instructional guidance, timely feedback, and

more interactive learning experiences. The inclusion of analytics also encourages reflective teaching practices, supporting informed instructional decision-making.

Significance for learners

Learners benefit from clearer course organization, improved communication with instructors, and increased opportunities for engagement. Personalized learning paths, interactive activities, and accessible content formats support diverse learning needs and preferences. Through strengthened teaching presence, students experience more visible instructional guidance, clearer expectations, and timely feedback, which can enhance motivation and persistence. Inclusive design features informed by Universal Design for Learning further promote flexible access and multiple content formats, helping learners remain engaged throughout the learning process.

Significance for educational institutions

At the institutional level, the platform offers a scalable approach to improving online instructional quality without increasing instructor workload. Centralized teaching tools promote consistency across courses, while learning analytics support professional development, quality assurance, and curriculum improvement. The modular system architecture also allows for future expansion and integration with other educational technologies, supporting long-term sustainability and adaptation to evolving digital learning demands.

Significance for educational policy:

This project highlights teaching presence as a foundational element of effective online learning, with implications for educational policy related to digital instruction and teacher support. The findings suggest that technology investments should prioritize platforms that facilitate instructor engagement, feedback, and instructional guidance

rather than focusing solely on content distribution. The outcomes of this project may inform institutional guidelines and broader strategies aimed at improving online education quality, strengthening teacher capacity, and promoting equitable learning opportunities.

Significance for educational technology development and research

From a research and development perspective, this project demonstrates how learning theories can be operationalized through platform design. By integrating the Community of Inquiry framework with Self-Determination Theory, Universal Design for Learning, and Cognitive Load Theory, the project presents a theory-informed approach to system development. It also contributes a model for design-based research in educational technology, illustrating how iterative development and user feedback can guide platform refinement. The findings support future research on adaptive systems, teaching presence, and digital pedagogy.

CHAPTER 2
LITERATURE REVIEW

This chapter examines the body of research relevant to online learning quality, instructional design, and teaching presence in digital environments. The purpose of the review is to situate the present study within existing scholarship and to identify theoretical and empirical foundations that inform the design of the adaptive e-learning platform.

The review begins with global research on online and blended learning, highlighting factors that influence engagement, retention, and instructional effectiveness. It then examines the Community of Inquiry framework, with particular emphasis on teaching presence as the central construct guiding this study. Subsequent sections explore how teaching presence relates to learner engagement, how it has been measured in prior research, and how platform design may enable or constrain its enactment. The review also considers complementary theoretical perspectives that inform feature-level design decisions.

Finally, the chapter examines regional research from the Middle East and Lebanon to contextualize the study and identify structural and institutional considerations relevant to platform implementation. The chapter concludes with a synthesis of the literature and the identification of a research gap that motivates the present investigation.

Review of relevant literature about the subject globally, in the region, and in Lebanon:

Large-scale studies and meta-analyses suggest that learning outcomes are influenced more by the quality of instructional design than by delivery mode alone. In many cases, well-designed blended courses outperform fully online or exclusively face-

to-face formats because they combine structured interaction with sustained instructor guidance. These findings indicate that the effectiveness of online learning depends on pedagogical coherence rather than technological format. Retention research further reinforces this conclusion, consistently documenting higher attrition rates in online courses where instructor presence and course organization are limited. Learners frequently cite lack of timely feedback, unclear expectations, and reduced sense of connection as primary reasons for withdrawal. Such patterns suggest that attrition often reflects structural and instructional factors rather than individual learner deficiencies.

Instructor presence also plays a significant role in promoting equity within distributed learning environments. Clear scaffolding, transparent learning pathways, and consistent feedback reduce uncertainty for students with varied prior knowledge and digital literacy. By making expectations explicit and providing incremental opportunities for success, structured instructor guidance can narrow performance gaps and support underprepared learners. Empirical work indicates that sequenced tasks, exemplar models, and formative checkpoints enhance learners' confidence and persistence, particularly in heterogeneous cohorts.

From a design perspective, this body of research implies several priorities for course and platform development. Course architectures that foreground sequencing and visibility through modular units, milestone indicators, and explicit assessment rubrics can reduce cognitive load and orient learners more effectively. Integrated feedback systems that combine automated cues with instructor commentary help sustain academic momentum and reinforce instructional presence. Likewise, facilitation tools such as targeted discussion prompts, moderation dashboards, and participation analytics

enable instructors to guide discourse toward learning objectives rather than merely monitor activity levels.

At the institutional level, these findings carry implications for policy and professional development. Investments in digital infrastructure alone are insufficient if not accompanied by training that emphasizes facilitation strategies, formative assessment design, and effective use of analytics. Administrative policies must also account for the workload demands of high-quality online facilitation by providing appropriate staffing models, time allocation, and technical support. Without such structural alignment, sustained teaching presence may remain difficult to enact consistently.

Finally, the literature calls for research that moves beyond binary comparisons of delivery modes toward more nuanced investigation of specific design elements and instructional practices. Longitudinal and mixed-methods studies linking platform data, instructional behaviors, and learner perceptions may clarify the mechanisms through which design influences engagement and learning outcomes. Translating these insights into coherent platform features and institutional supports will be critical to realizing the potential of online and blended learning as equitable, effective, and sustainable educational models.

The Community of Inquiry Framework:

The Community of Inquiry (CoI) framework explains meaningful online learning as the interaction of three interdependent elements: teaching presence, social presence, and cognitive presence. Social presence refers to participants' ability to present themselves socially and emotionally as real individuals within the online environment. Cognitive presence describes learners' capacity to construct and confirm meaning through sustained reflection and dialogue. Teaching presence functions as the

organizing and guiding force that shapes both social interaction and cognitive engagement.

The framework has been widely applied across disciplines and instructional contexts. Empirical studies and systematic reviews consistently indicate that teaching presence is strongly associated with learner satisfaction and perceptions of course quality. In many cases, it also plays a coordinating role by supporting social connection and guiding cognitive inquiry.

By foregrounding instructional design and facilitation, CoI provides a structured lens for examining how learning environments shape the quality of interaction. This emphasis aligns directly with the present project, which investigates how platform design can strengthen teaching presence through integrated tools and instructional workflows.

Teaching Presence: Conceptual Foundations:

Teaching presence occupies a central position within the Community of Inquiry (CoI) framework and has evolved into one of the most influential constructs in research on online and blended learning. Originally conceptualized as the element that designs, facilitates, and directs cognitive and social processes toward meaningful learning outcomes, teaching presence extends beyond simple instructor visibility. It represents the intentional orchestration of learning experiences within digital environments.

The construct is typically described as comprising three interrelated functions: instructional design and organization, facilitation of discourse, and direct instruction. Instructional design and organization involve the structuring of course content, sequencing of activities, clarification of expectations, and establishment of timelines. This component reflects decisions made prior to and during course delivery that shape

the overall learning pathway. In online contexts, where implicit cues are limited, clear design becomes particularly important for reducing ambiguity and promoting learner autonomy.

Facilitation of discourse refers to the instructor's role in sustaining meaningful dialogue among learners. This includes encouraging participation, maintaining focus on learning objectives, weaving together contributions, and prompting deeper reflection. Unlike face-to-face environments where interaction may occur organically, online discourse often requires deliberate moderation to prevent fragmentation or superficial participation. Facilitation therefore represents an active and ongoing instructional function.

Direct instruction encompasses subject-matter expertise expressed through explanation, clarification, feedback, and corrective guidance. It involves diagnosing misconceptions, reinforcing key concepts, and synthesizing discussion threads. In digital environments, where asynchronous communication is common, timely and targeted feedback becomes a primary mechanism through which direct instruction is enacted.

Over time, empirical research has demonstrated that teaching presence strongly predicts learners' perceptions of course quality and satisfaction. Studies across disciplines have shown that students who perceive strong teaching presence report clearer expectations, stronger engagement, and greater confidence in achieving learning objectives. Teaching presence has also been found to mediate the relationship between social and cognitive presence, suggesting that it plays a coordinating role within the broader CoI model. In this sense, teaching presence does not operate independently but shapes the conditions under which meaningful knowledge construction occurs.

Recent research has also expanded the understanding of teaching presence beyond individual instructor behaviors to include structural and technological factors. Scholars increasingly argue that teaching presence is not solely a function of pedagogical intent but is also influenced by the affordances of the learning environment. Course management systems, interface design, feedback tools, and analytics dashboards can either facilitate or hinder instructors' ability to enact instructional design, discourse facilitation, and direct guidance. This shift moves the conversation from teacher-centered performance to system-supported pedagogy.

Despite its widespread application, the construct has also been examined critically. Some researchers question whether teaching presence can be fully captured through perception surveys alone, arguing that behavioral and system-level data provide complementary evidence of instructional enactment. Others highlight the need to contextualize teaching presence within cultural and institutional realities, where workload, class size, and technological infrastructure may shape its manifestation. These discussions suggest that teaching presence is dynamic and context-dependent rather than fixed or uniform across settings.

Within the context of adaptive e-learning systems, teaching presence takes on additional complexity. Adaptive technologies introduce new possibilities for personalized feedback, automated progress tracking, and data-informed intervention. However, without intentional integration into pedagogical workflows, such features may remain underutilized. Understanding teaching presence as both a pedagogical and structural construct therefore becomes essential when examining how platform design can strengthen instructional guidance in online environments.

Taken together, the literature positions teaching presence as a foundational element of effective online learning, encompassing design, facilitation, and direct instruction while interacting with technological affordances and contextual constraints. This conceptual foundation provides the basis for examining how adaptive platform design can operationalize and enhance teaching presence through integrated instructional tools and workflows.

Teaching Presence and Engagement:

Empirical research consistently links teaching presence to multiple dimensions of student engagement in online learning environments. Behavioral engagement tends to increase when instructors clearly structure tasks and clarify participation expectations, providing learners with explicit guidance on how to engage with course activities. Emotional engagement is strengthened when instructors demonstrate visible responsiveness and sustained guidance, helping students feel supported and connected within the course. Cognitive engagement deepens when instructors offer meaningful prompts, timely feedback, and instructional direction that challenge learners to reflect and extend their understanding.

Beyond these direct effects, teaching presence also scaffolds cognitive presence by guiding inquiry and structuring reflective dialogue. Active moderation, synthesis of discussion contributions, and purposeful redirection by instructors contribute to deeper levels of learner reflection and knowledge construction. The literature further suggests that social presence alone is insufficient to sustain meaningful learning. While social connection is important, effective online learning requires teaching presence to steer interaction toward clearly defined learning objectives and maintain academic focus.

Measuring Teaching Presence:

Teaching presence is typically measured through a combination of perception-based and behavioral indicators. One of the most common approaches involves learner surveys, which capture students' perceptions of instructor involvement, clarity of course design, facilitation of discussion, and quality of feedback. These instruments are valuable because they reflect how teaching presence is experienced from the learner's perspective.

In addition to perception measures, researchers frequently employ content analysis to examine instructor messages and discussion contributions, identifying evidence of facilitation and direct instruction. Quantitative indicators such as interaction frequency including the number of posts, replies, and participation patterns have also been used to document instructor engagement within the course. More recently, learning analytics derived from system logs have provided opportunities to track feedback cycles, facilitation actions, and engagement signals in more systematic ways.

While perception measures reveal how learners interpret and experience teaching presence, behavioral and analytics-based indicators document enacted instructional practices. Emerging research suggests that integrating survey data with behavioral evidence provides a more comprehensive and actionable understanding of teaching presence. This integrated approach is particularly relevant for platform-based projects, where system logs can offer concrete evidence of instructional activity patterns alongside user perceptions.

Platform Design as an Enabler of Teaching Presence:

Recent scholarship increasingly recognizes that teaching presence is not enacted solely through instructor intention or pedagogical knowledge, but is also shaped by the

technological architecture of the learning environment. While early research on online learning focused primarily on instructor behaviors, more recent studies emphasize the role of platform design in structuring, enabling, or constraining instructional practices. In digital environments, pedagogical enactment occurs within technological systems, and therefore the affordances embedded within those systems directly influence how teaching presence manifests.

One critical dimension of platform design is course organization. Structured modular layouts, clearly sequenced learning paths, visible progress indicators, and transparent timelines contribute to the instructional design component of teaching presence. Research suggests that when course structure is intuitive and coherent, learners report greater clarity and reduced cognitive uncertainty. From an instructor perspective, structured environments reduce the need for repeated clarification and allow greater focus on facilitation and feedback. In contrast, poorly organized platforms may increase confusion, generate redundant communication, and dilute instructional authority.

Feedback workflows represent another essential design affordance. Teaching presence relies heavily on timely and meaningful feedback, yet fragmented systems often require instructors to navigate multiple tools for grading, commenting, and communication. Integrated feedback mechanisms such as inline commenting, rubric-based evaluation, automated notifications, and consolidated messaging streamline direct instruction and increase instructional visibility. Studies indicate that responsiveness and clarity of feedback are strongly associated with perceived instructor involvement and learner persistence. When platform design reduces friction in feedback delivery, teaching presence becomes more sustainable across large or diverse cohorts.

Facilitation tools further illustrate the interaction between design and pedagogy. Effective discourse in online environments requires active moderation, prompting, synthesis, and redirection. Platforms that provide discussion alignment with learning objectives, moderation dashboards, participation tracking, and notification systems help instructors sustain discourse quality. Without such tools, facilitation may become reactive rather than intentional, particularly in asynchronous settings. Research suggests that instructor-guided discourse promotes deeper cognitive engagement and reduces superficial participation patterns often observed in minimally structured forums.

Learning analytics add an additional layer of instructional support by enhancing instructor awareness. Dashboards that aggregate participation trends, activity completion rates, and performance indicators allow instructors to identify disengagement patterns early. This data-informed visibility supports proactive intervention, reinforcing the guiding and monitoring dimensions of teaching presence. However, scholars caution that analytics alone do not guarantee improved instruction; their impact depends on how seamlessly they are integrated into pedagogical workflows and whether instructors can interpret and act upon the data efficiently.

The rise of adaptive e-learning systems introduces further complexity. Adaptive platforms can personalize content pathways, recommend resources, and automate certain instructional functions based on learner behavior. While such features have the potential to support differentiation and responsiveness, research indicates that automation must complement rather than replace human instructional guidance. Adaptive mechanisms that operate independently of instructor oversight may inadvertently weaken perceived teaching presence if learners interpret automation as reduced instructor involvement. Consequently, effective adaptive design integrates

automated supports with instructor-facing controls and visibility, preserving the human dimension of teaching presence.

Beyond individual features, the broader concept of instructional workflow coherence has emerged as a key theme in recent literature. Coherent systems consolidate course organization, communication, assessment, and analytics within a unified interface, reducing cognitive and administrative burden for instructors. When workflows are streamlined, instructors can devote more cognitive resources to higher-order pedagogical tasks, including facilitation and feedback. In contrast, fragmented systems increase transactional workload and may undermine consistent enactment of teaching presence.

Overall, the literature suggests that teaching presence is both pedagogical and infrastructural. It depends not only on instructor expertise but also on whether platform design provides efficient, integrated mechanisms that support design, facilitation, and direct instruction. In contexts where institutional resources and technological infrastructure vary, the role of platform coherence becomes even more pronounced. Understanding teaching presence as partially operationalized through system design provides a foundation for examining how adaptive e-learning platforms can strengthen instructional guidance through unified features and structured workflows.

Building on this discussion of platform design as an enabler of teaching presence, it is also important to position the proposed platform in relation to established learning management systems commonly used in online education.

Comparison with established learning management systems

Established learning management systems (LMSs), such as Moodle and similar course management platforms, have played an important role in expanding access to online and blended learning. These systems typically provide a broad set of administrative and instructional tools, including content upload, assignment submission, grade management, discussion forums, and communication functions. Their flexibility and scalability have made them widely adopted across higher education and school contexts. However, research and practice suggest that the availability of multiple tools does not automatically ensure pedagogical coherence or strong instructional presence within online learning environments.

A recurring concern in the literature is that many LMSs are often used primarily as repositories for course materials rather than as environments intentionally structured to support active teaching and guided interaction. In such contexts, features such as forums, messaging tools, and grading systems may exist, but they are frequently used in isolation rather than within an integrated pedagogical workflow. As a result, the responsibility for connecting course organization, feedback, facilitation, and learner monitoring often falls entirely on the instructor. This can increase workload and produce uneven experiences across courses, especially when instructors differ in digital readiness or pedagogical approach.

Compared with these conventional systems, the present project is not intended to replace large-scale institutional LMS platforms in terms of breadth of functionality. Instead, its contribution lies in its explicit pedagogical orientation. The proposed adaptive e-learning platform was designed specifically to operationalize teaching presence through a coherent set of integrated features. Course organization tools,

feedback workflows, facilitation functions, and learning analytics are brought together as parts of a unified instructional process rather than as disconnected options. This design aims to make instructional guidance more visible, structured, and manageable within the digital environment.

Another point of distinction concerns the theoretical grounding of the proposed system. While many established LMSs provide general-purpose teaching tools, the platform developed in this project is explicitly informed by the Community of Inquiry framework, with teaching presence as the central design priority. In addition, Self-Determination Theory, Universal Design for Learning, and Cognitive Load Theory inform specific design decisions related to learner motivation, accessibility, and clarity of presentation. This theory-informed approach positions the platform not simply as a technical system, but as a pedagogically guided environment intended to strengthen instructional quality.

The comparison therefore highlights that the innovation of the proposed platform lies less in offering more tools than in organizing those tools around a specific educational purpose. By centering the design on teaching presence and reducing fragmentation across instructional tasks, the platform seeks to provide added value in areas where conventional LMS use may remain administratively functional but pedagogically under-integrated.

Table 1

Comparative Analysis of Conventional LMSs and a Teaching-Presence-Centered Platform

Dimension	Conventional LMSs (e.g. Moodle)	Proposed Platform
Main orientation	General course and content management	Teaching-presence-centered instructional workflow
Course organization	Often flexible but instructor-dependent	Structured pathways and clearer instructional sequencing
Feedback	Available through separate tools or modules	Integrated within the instructional workflow
Discussion	Forum tools available	Question-and-reply interaction linked to facilitation
Analytics	Often available but may require additional configuration	Used as direct support for instructor awareness and guidance
Pedagogical grounding	Broad and general-purpose	Explicitly grounded in CoI, supported by SDT, UDL, and CLT

This comparison highlights that the proposed platform's contribution lies not in replacing conventional LMSs, but in providing a more explicitly pedagogy-driven environment centered on teaching presence.

Supporting Theories for Design Decisions:

While the Community of Inquiry framework serves as the primary analytic lens in this study, complementary learning theories inform specific design decisions within the platform. These theories do not replace teaching presence as the central construct; rather, they provide theoretical justification for how particular features are structured. Self-Determination Theory (SDT) informs features intended to support learner motivation by fostering autonomy, competence, and relatedness. Design elements that allow learners to navigate structured pathways, receive constructive feedback, and experience meaningful interaction align with these motivational principles. Universal Design for Learning (UDL) guides accessibility and flexible representation by encouraging multiple means of engagement, content delivery, and participation, thereby supporting diverse learner needs. Cognitive Load Theory (CLT) informs decisions related to clarity of presentation, interface organization, and reduction of extraneous cognitive load, helping ensure that instructional materials support comprehension rather than overwhelm learners.

Together, these frameworks strengthen the pedagogical grounding of the platform's design while maintaining teaching presence as the study's central analytic focus. They function as supporting lenses that inform implementation choices without displacing the primary emphasis on how design enhances teaching presence in online learning environments.

Regional Context: Middle East:

Research in the Middle East documents the rapid expansion of online and blended learning across educational institutions, often accompanied by persistent structural constraints. Studies highlight challenges such as uneven technological infrastructure, variability in institutional readiness, and limited opportunities for sustained professional development. While digital adoption has increased, the quality and consistency of implementation remain uneven across contexts.

Instructors in the region frequently report increased workload associated with managing fragmented systems, navigating multiple communication channels, and compensating for inadequate technical or instructional support. These conditions can make it difficult to sustain consistent teaching presence, particularly when course organization, feedback, and facilitation depend on disconnected tools.

Taken together, these findings underscore the need for platforms that integrate course organization, communication, and learning analytics into a coherent instructional workflow. In contexts where institutional resources and infrastructure may be variable, systems that streamline instructional processes and support instructor visibility become especially important for maintaining engagement and instructional quality.

Lebanon Context:

Lebanon's education sector has experienced significant disruption in recent years, resulting in increased reliance on digital platforms across both school and higher education contexts. This shift has intensified attention on the quality and sustainability of online learning implementation. Studies examining student and faculty experiences in Lebanon report recurring challenges related to learner engagement, digital preparedness, and the availability of technical and instructional support. These findings

suggest that the effectiveness of online learning in the Lebanese context is influenced not only by access to technology but also by the strength of instructional design and system-level support.

At the policy level, national and international initiatives have increasingly emphasized digital transformation and the development of scalable learning platforms aligned with curriculum and institutional goals. However, the literature indicates that expanding access alone is insufficient for long-term impact. Sustainable digital learning requires deliberate attention to instructional quality, clarity of course structure, and meaningful instructor–learner interaction.

Within this context, strengthening teaching presence through integrated platform design directly addresses identified national priorities. By supporting course organization, facilitation, feedback workflows, and instructional visibility, platform design can contribute to more consistent and responsive teaching practices. Such an approach aligns with broader efforts to enhance digital learning quality while recognizing the structural and contextual realities of the Lebanese education system.

Synthesis and research gap:

The literature consistently indicates that the effectiveness of online learning depends heavily on instructional design and the quality of interaction within the learning environment. Within this body of research, teaching presence emerges as a central construct influencing learner engagement, satisfaction, and perceived instructional quality. At the same time, growing evidence suggests that platform design plays an important role in shaping how consistently and sustainably teaching presence can be enacted. When instructional workflows are fragmented or tools are poorly integrated, maintaining strong teaching presence becomes more difficult.

Regional research, including studies conducted in Lebanon, further highlights contextual constraints such as uneven infrastructure, institutional readiness challenges, and limited instructional support. These conditions intensify the need for integrated systems that streamline course organization, facilitation, and feedback processes. In such environments, platform coherence and instructional visibility become especially important for sustaining engagement and instructional quality.

Despite the extensive literature on teaching presence and online learning, relatively few studies explicitly examine how adaptive e-learning platforms operationalize teaching presence through unified design features such as structured workflows, integrated feedback systems, facilitation tools, and learning analytics. This gap in the empirical literature provides the foundation for the present project, which seeks to examine how an adaptive e-learning platform can be designed to enhance teaching presence in online learning environments.

Conceptual framework of the study:

This study adopts the Community of Inquiry (CoI) framework as its primary theoretical lens, positioning teaching presence as the central analytic construct. Within CoI, teaching presence functions as the organizing force that structures learning activities, facilitates interaction, and provides direct instructional guidance. It encompasses three interrelated dimensions: instructional design and organization, facilitation of discourse, and direct instruction. Together, these dimensions define how instructors make their pedagogical presence visible in online environments.

The study advances the argument that teaching presence is not enacted solely through instructor intention but is also shaped by platform architecture. Because instructional practices occur within technological systems, the design of those systems influences

how consistently and effectively teaching presence can be operationalized. Accordingly, the adaptive e-learning platform developed in this project integrates structured course organization, feedback workflows, facilitation tools, and learning analytics dashboards to support each dimension of teaching presence.

Complementary theories further inform feature-level decisions. Self-Determination Theory supports motivational elements related to autonomy, competence, and relatedness. Universal Design for Learning guides accessibility and flexible representation. Cognitive Load Theory informs clarity of interface and content presentation. These theories strengthen pedagogical alignment without displacing teaching presence as the study's central construct.

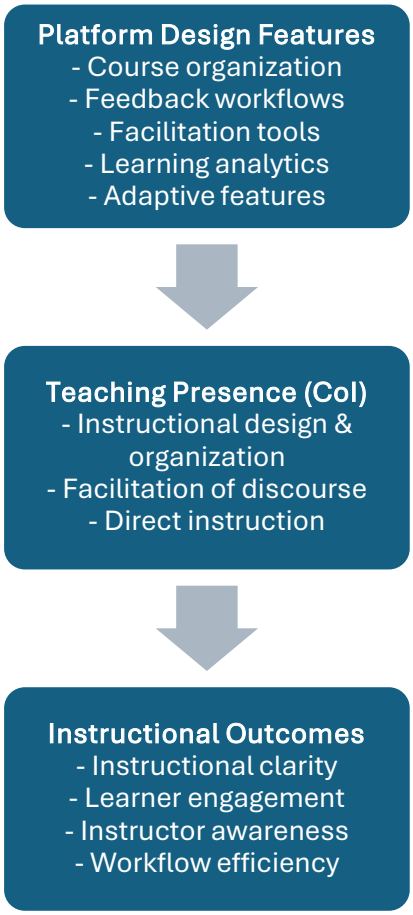
The conceptual model guiding the study can therefore be expressed as:

Design features of the adaptive platform → Operationalized teaching presence → Enhanced instructional clarity and engagement.

This model frames both the evaluation strategy and the methodological procedures described in the following chapter.

Figure 1

Conceptual Framework Of The Study Linking Platform Design Features, Teaching Presence, And Instructional Outcomes.



The figure illustrates the conceptual model guiding this study. The model assumes that integrated platform design features support the operationalization of teaching presence, which in turn enhances instructional clarity, learner engagement, and overall workflow efficiency in online learning environments.

Chapter summary:

This chapter reviewed global, regional, and Lebanon-specific literature on online learning quality, instructional design, and the Community of Inquiry framework. The literature consistently demonstrates that the effectiveness of online learning depends

less on mere technological access and more on the quality of instructional design and interaction within digital environments. Student engagement, satisfaction, and persistence are closely associated with clear course structure, purposeful facilitation, and sustained instructor involvement.

The Community of Inquiry framework served as the primary theoretical foundation for this review. Within this model, teaching presence—comprising instructional design and organization, facilitation of discourse, and direct instruction—emerged as a central determinant of learner engagement and perceived instructional quality. Empirical findings indicate that teaching presence plays a coordinating role in shaping both social and cognitive processes in online learning environments.

The review further examined how platform design influences the enactment of teaching presence. Research suggests that structured course organization, integrated feedback workflows, facilitation tools, and learning analytics can strengthen instructional visibility and coherence. In contrast, fragmented systems and poorly integrated tools may increase instructor workload, reduce efficiency, and weaken the consistent expression of teaching presence.

Regional studies, including those conducted in the Middle East and Lebanon, highlight contextual constraints such as uneven infrastructure, variable institutional readiness, and limited instructional support. These conditions amplify the need for coherent and integrated instructional systems capable of sustaining teaching presence under resource and implementation challenges.

Despite the substantial body of research on teaching presence and online learning, relatively few studies explicitly examine how adaptive e-learning platforms operationalize teaching presence through unified and system-level design features. This

gap provides the foundation for the present study, which investigates how the design of an adaptive e-learning platform can enhance teaching presence in online learning environments.

The following chapter outlines the research design, development procedures, and evaluation methods used to implement and assess the adaptive e-learning platform.

CHAPTER 3
METHODOLOGY

Project Design

This study employs a Design-Based Research (DBR) framework to guide the development and evaluation of an adaptive e-learning platform designed to strengthen teaching presence. DBR is particularly appropriate for educational technology research because it connects theoretical principles with real instructional practice through iterative design cycles conducted in authentic learning environments. Rather than isolating variables under controlled conditions, this approach treats the learning environment as a complex system and seeks to produce both a functional innovation and an understanding of how that innovation operates in practice.

Rationale for Design-Based Research

The primary objective of this project extends beyond building a technological tool; it aims to investigate how specific design features support teaching presence through structured instructional workflows. Because this objective requires a close connection between pedagogical theory and real-world implementation, DBR was selected for its ability to:

- support iterative refinement of educational innovations,
- enable testing within authentic instructional contexts,
- integrate user feedback into successive design cycles,
- generate practical solutions while contributing to theoretical understanding.

Evaluating the platform within a natural learning environment allows the study to capture meaningful evidence of usability and instructional value.

Research Orientation

This research adopts a qualitative-dominant orientation supported by targeted quantitative indicators. The study focuses on how platform design choices can support instructional practices rather than measuring standardized learning outcomes.

Key areas of investigation include:

- Instructor practices: how tools are used to organize content and facilitate learning activities;
- Design effectiveness: the extent to which platform features support clarity and interaction;
- Engagement patterns: insights from system analytics and user feedback;
- Workflow integration: how platform structure influences the enactment of teaching presence.

Qualitative insights are complemented by quantitative indicators such as interaction frequency and system logs, providing a comprehensive understanding of platform use.

Design Principles Guiding the Platform

The platform architecture is grounded in the Community of Inquiry (CoI) framework and informed by complementary learning theories to ensure pedagogical alignment.

1. Teaching Presence (Primary Framework)

The system was designed to support:

• instructional design and organization,

• facilitation of discourse,

• direct instruction and feedback.

2. Self-Determination Theory (SDT)

    Design features support learner motivation by promoting:

    • autonomy through flexible navigation,

    • competence through progress indicators and feedback,

    • relatedness through communication tools.

3. Universal Design for Learning (UDL)

    Accessibility is supported through:

    • multiple content formats,

    • flexible participation options,

    • inclusive interface design.

4. Cognitive Load Theory (CLT)

    Interface design and content presentation aim to:

    • reduce extraneous cognitive load,

    • support clarity and comprehension,

    • guide attention through structured layouts.

In addition to supporting teaching presence, the platform design also considered the need to reduce instructor burden, particularly for users with limited digital literacy. Although the integration of course organization, feedback, discussion, and analytics features strengthens instructional coherence, it may also introduce complexity if not carefully structured. For this reason, the system was conceptualized with support mechanisms intended to simplify use and improve accessibility, including default course templates to streamline course setup, guided onboarding to assist first-time navigation of platform functions, and feedback-support tools designed to reduce repetitive

instructional workload. These design choices reflect the understanding that effective platform design must balance functional richness with usability so that integrated systems reduce, rather than unintentionally increase, instructor burden. In this way, the platform aims to sustain teaching presence through workflows that are not only pedagogically coherent but also manageable in practice.

Iterative Development Process

The platform was developed through iterative DBR cycles consisting of four phases:

1- Needs Analysis and Conceptualization

   Instructional challenges were identified and theoretical principles translated into system requirements.

2- Prototype Development

   Core features were implemented, including course organization tools, feedback workflows, facilitation features, and analytics dashboards.

3- Pilot Implementation

   The platform was deployed in an authentic instructional setting to observe usability and instructional integration.

4- Refinement

   User feedback and usage data were analyzed to identify usability issues and guide improvements.

Platform Features Implemented

The platform operationalizes teaching presence through a set of integrated functional modules designed to support instructional organization, communication, feedback, and learner monitoring within a unified web-based environment.

1- Course Organization Tools

• modular course structures,

• visible learning pathways,

• progress tracking.

2- Facilitation Tools

• discussion management features,

• participation tracking,

• communication tools supporting interaction.

3- Feedback and Instruction Tools

• integrated feedback workflows,

• commenting and notification systems,

• structured assessment support.

4- Learning Analytics Dashboard

• monitoring engagement trends,

• identifying participation patterns,

• supporting early intervention.

5- Adaptive Support Features

In this project, adaptivity refers primarily to progress-based navigation and instructor-visible learner progression rather than full algorithmic personalization. The platform supports adaptive guidance by allowing learners to move through structured pathways according to task completion while enabling instructors to monitor progress and intervene when needed.

• progress-based content navigation,

• personalized learning pathways,

• instructor visibility into learner progress.

In addition to these general functional categories, the platform includes several implemented interfaces that demonstrate the practical realization of the system. These include an assignment creation interface that allows instructors to define assignment titles, dates, times, course associations, and descriptions; an assignment management interface used to organize and review posted assignments; a question-posting interface through which learners can submit questions and categorize them by topic; a discussion and reply interface that supports interaction between users; and a user navigation panel that provides access to course-related and account-related functions. Together, these implemented interfaces show how the platform translates pedagogical design principles into concrete web-based components that support instructional organization, communication, and learner engagement.

Pilot implementation context

The pilot implementation took the form of a limited feature-validation trial designed to examine the usability and instructional relevance of the platform's core modules. Rather than functioning as a large-scale course deployment, the pilot focused on representative instructor and learner interaction with key implemented features such as assignment management, question posting, discussion replies, and navigation of course-related functions. This approach made it possible to evaluate workflow coherence, interface clarity, and the extent to which the platform supported visible teaching presence within a controlled instructional context. Specifically, the pilot examined:

- usability of platform features
- integration into instructor workflows

- visibility of instructor presence,
- engagement patterns reflected in system activity.

Ethical considerations

All research procedures adhered to ethical research standards. Participation was voluntary, and data were anonymized to protect participant identities. Platform analytics were analyzed in aggregate form, ensuring that personal identifiers were excluded from the research dataset.

Summary of Research Design

This study employs a design-based research approach to integrate theoretical frameworks with practical platform development. Through iterative design, real-world implementation, and a combination of qualitative insights and quantitative indicators, the project examines how purposeful platform design can support teaching presence and enhance engagement in online learning environments.

Context of the Project

The development and implementation of the adaptive e-learning platform took place within a higher education landscape characterized by a significant shift toward digital learning environments and an increasing demand for flexible and resilient instructional delivery. Over the past decade, universities have expanded online and blended learning models to broaden access and ensure academic continuity. However, the rapid pace of institutional digitization has often outpaced the evolution of tools designed to support instructional practice. As a result, instructors must navigate complex responsibilities including organizing content, facilitating meaningful discourse, monitoring learner progress, and supporting diverse levels of student preparedness—

within systems that frequently prioritize administrative management over pedagogical coherence.

Conventional learning management systems (LMS) often function primarily as repositories for course materials rather than integrated instructional environments. Faculty members commonly rely on multiple external tools for communication, assessment, and student tracking, including messaging applications, third-party assessment platforms, and manual record-keeping processes. This fragmentation increases cognitive and administrative workload while reducing the visibility and continuity of instructor presence within the virtual classroom.

These challenges are particularly pronounced in Middle Eastern contexts, including Lebanon, where the rapid expansion of online learning has intersected with structural constraints such as inconsistent technological infrastructure, economic instability, and varying levels of digital literacy among both instructors and students. Although digital access has expanded, research indicates that students often experience reduced engagement, unclear expectations, and limited instructional support. Faculty members similarly report difficulty sustaining meaningful interaction and maintaining a consistent teaching presence across disconnected systems.

In response to these pressures, educational institutions are increasingly recognizing that digital transformation must extend beyond expanding access to technology and instead prioritize instructional quality, coherence, and sustainability. This shift highlights the importance of platforms that integrate course organization, communication, assessment, and engagement monitoring into unified workflows that support teaching practice.

The adaptive e-learning platform developed for this project was designed to address these contextual needs. By integrating structured course organization, facilitation tools, feedback workflows, and real-time learning analytics within a cohesive interface, the platform aims to reduce technical fragmentation and enhance the visibility of instructional guidance. Such integration supports instructors in maintaining consistent communication, guiding learning activities, and identifying students who may require additional support.

The pilot implementation was conducted within an authentic instructional setting to observe how the platform operates under the practical conditions of digital teaching. Evaluating the system within real classroom workflows allowed the study to examine usability, integration into instructional routines, and the extent to which platform features supported visible teaching presence.

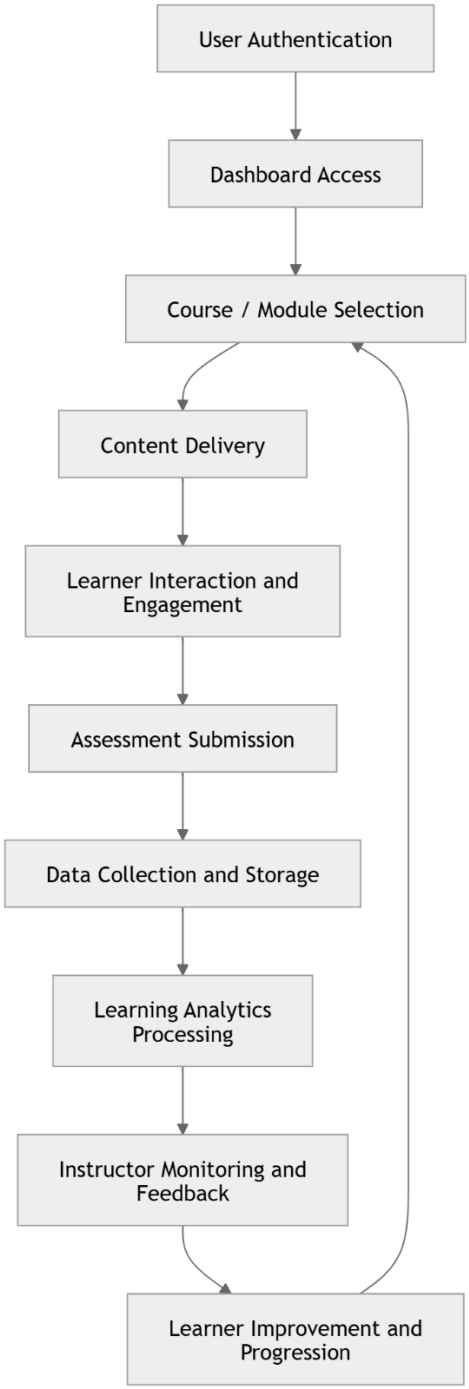
Overall, the context of this project reflects the convergence of institutional digitization, regional constraints, and pedagogical demands. The growing reliance on digital learning environments, combined with challenges related to instructional coherence and engagement, underscores the need for platforms designed to support teaching presence. By addressing these contextual realities, the project contributes a scalable, pedagogically grounded solution aligned with both regional educational priorities and global trends in digital learning.

Platform Workflow

To better illustrate the functioning of the proposed platform, the overall workflow is presented in Figure 1.

Figure 2

E-Learning Workflow: From Student Engagement to Analytics-Driven Instruction



The process begins when the student logs into the platform and accesses the personal dashboard. The learner then selects a course or module, studies the available learning materials, and interacts with the embedded platform tools such as discussion spaces, guidance prompts, feedback, and reminders. After completing quizzes and assignments, the system records participation and performance data. These data are displayed in an analytics dashboard that allows the instructor to monitor learner progress and provide targeted feedback and support. The cycle then continues as the student revises, advances, and engages with the following module.

Project implementation procedures and products generated

The implementation of the adaptive e-learning platform followed a Design-Based Research (DBR) trajectory to ensure that each technical component addressed a clearly identified pedagogical need. The iterative process began with a needs analysis and requirements mapping phase, which examined instructional challenges that limit teaching presence in digital environments. Informal consultations with instructors and a review of existing course workflows revealed a recurring fragmentation problem, whereby communication, feedback, and student tracking were distributed across disconnected tools. These findings were mapped to the three core functions of teaching presence within the Community of Inquiry (CoI) framework: instructional design and organization were supported through structured learning pathways; facilitation of discourse was enhanced through guided interaction tools; and direct instruction was strengthened through integrated feedback workflows.

The study then progressed to the design and development phase, during which the platform's core architecture was constructed. Key components included modular course

organization, participation monitoring tools, and instructor dashboards designed to reduce cognitive load while enhancing instructional visibility. The interface emphasized clarity, structured navigation, and streamlined workflows to support routine instructional tasks.

During the pilot implementation phase, the platform was deployed within an authentic instructional setting. This phase enabled observation of how instructors organized course materials, facilitated discussions, and delivered feedback using the system. Conducting the pilot in a real classroom environment allowed the study to evaluate usability, workflow integration, and the practical enactment of teaching presence.

The process concluded with an iterative refinement phase, in which platform analytics and participant feedback were used to identify usability challenges and optimize system functionality. Adjustments were made to improve navigation clarity, dashboard readability, and workflow efficiency, ensuring that the platform remained intuitive while maintaining alignment with pedagogical objectives.

Products Generated

The project produced a cohesive digital learning environment designed to support teaching presence through integrated instructional workflows.

At the core of the project is the adaptive e-learning platform, a web-based environment that centralizes course organization, communication, and engagement monitoring.

Key system components include:

- Instructor Dashboard: Provides engagement indicators and participation patterns to support timely instructional intervention.
- Feedback Workflow System: Enables streamlined delivery of rubrics, comments, and instructional guidance.

- Facilitation Suite: Supports discussion moderation and tracks student participation.
- Structured Learning Path Modules: Present sequenced milestones and progress indicators to clarify learning expectations.

Together, these components create an integrated instructional environment that replaces fragmented workflows commonly associated with traditional learning management systems.

Selected screenshots of implemented interfaces are presented below to illustrate the practical realization of the platform's core modules.

Figure 2

This Page Allows Instructors To Create Assignments By Entering The Title, Course, Dates, Time, And Description.

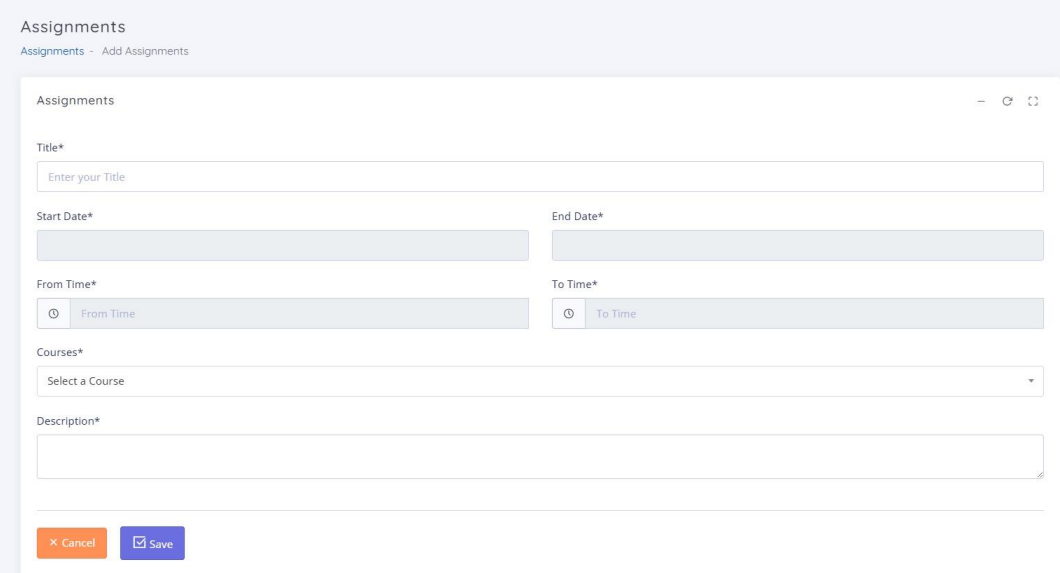


Figure 3

This Page Enables Learners To Submit Topic-Based Questions With A Title And Detailed Description.

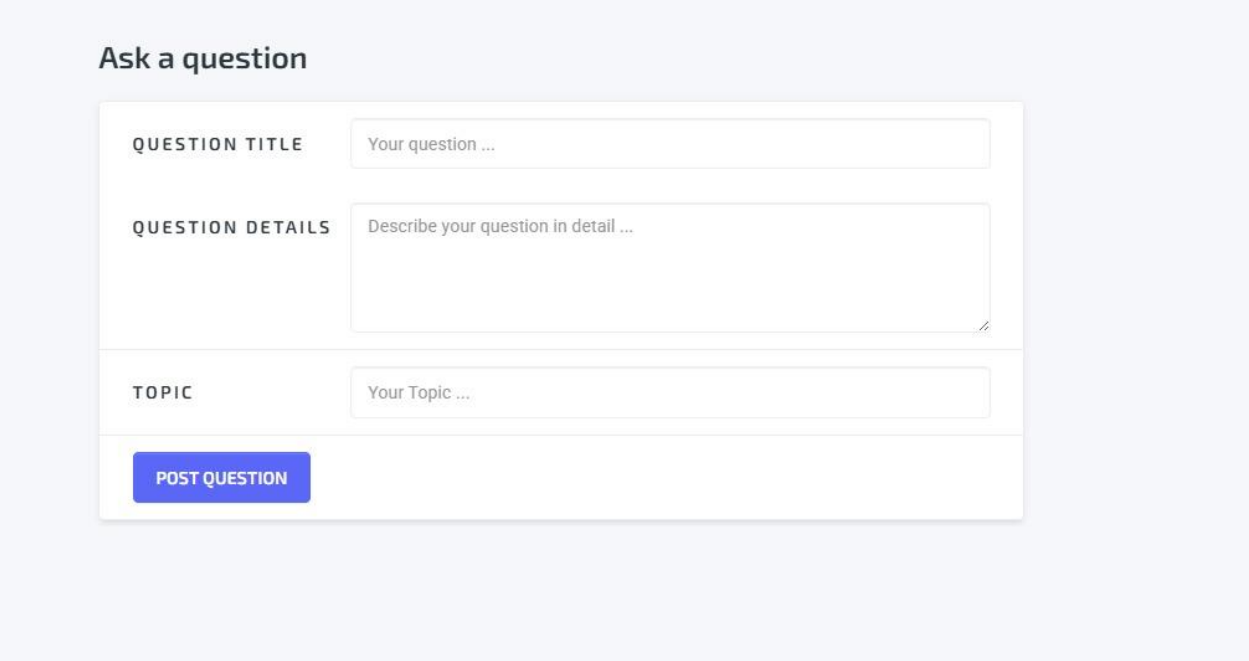
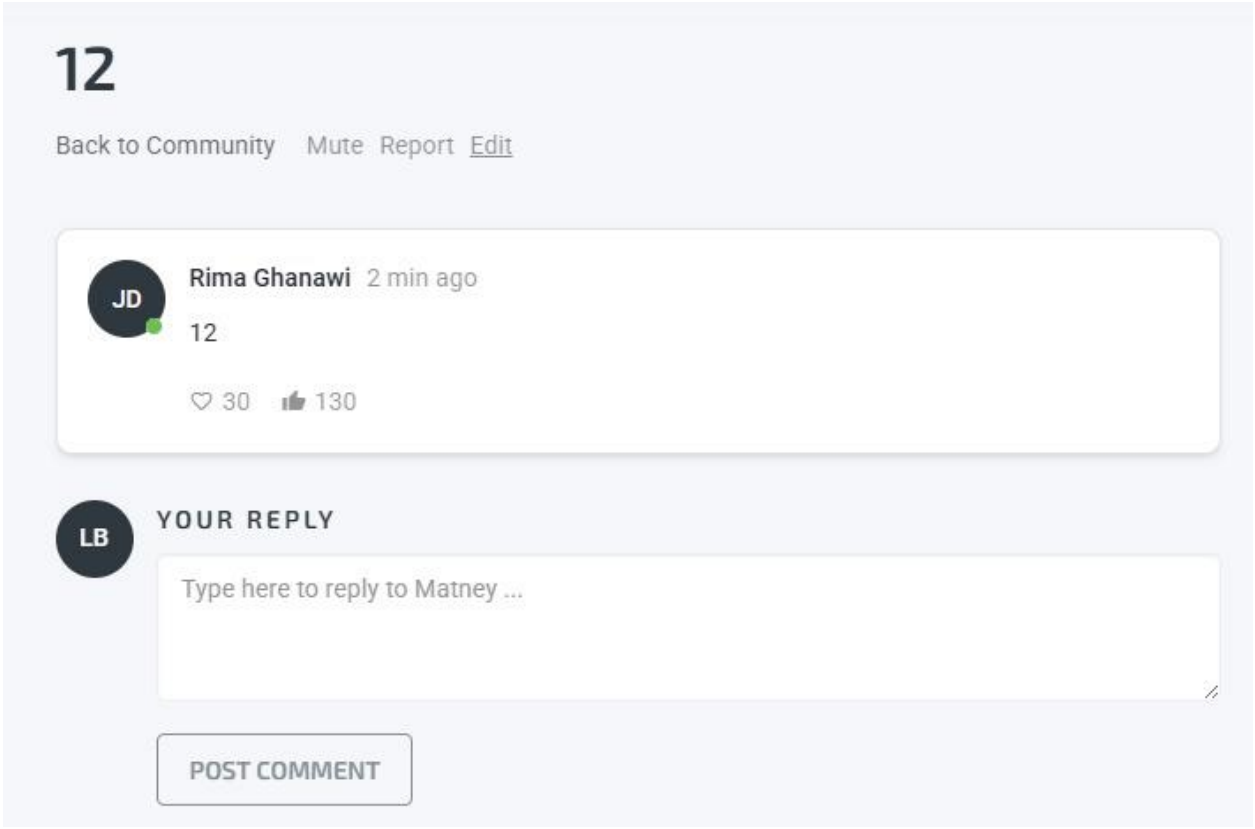


Figure 4

This Interface Supports Interactive Communication Through Question-Based Discussion And Replies.



Data Collection Procedures

To evaluate platform implementation and instructional use, a multi-modal data collection strategy was employed to capture both behavioral patterns and user perceptions.

Platform analytics (system logs) provided objective behavioral data, including:

- frequency of instructor feedback,
- student login patterns,

- activity completion rates,
- participation levels.

These quantitative indicators were complemented by qualitative sources:

- Instructor reflections, documenting usability and instructional workflow integration.
- Student feedback, capturing perceptions of clarity, communication, and engagement.
- Observational notes, recording workflow integration and navigation challenges during pilot use.

Data were collected continuously throughout the pilot implementation. All data were anonymized to protect participant confidentiality.

Data Analysis Procedures

A mixed-methods analysis approach was employed to integrate behavioral data with user experience insights.

Quantitative analytics were analyzed using descriptive statistics to identify patterns in engagement, participation, and instructional activity.

Qualitative data from reflections and observations were analyzed using thematic analysis to identify recurring themes related to usability, workflow efficiency, and instructional visibility.

Triangulation of data sources enhanced interpretive validity by comparing perceived experiences with observed system use. For example, instructor perceptions of feedback efficiency were examined alongside system logs documenting feedback frequency.

This integrated analysis enabled a comprehensive understanding of how platform design influences instructional practices and supports teaching presence in online learning environments.

CHAPTER 4
FINDINGS AND DISCUSSION

Introduction

This chapter examines the practical outcomes of the pilot implementation of the adaptive e-learning platform, with particular attention to how its design supported teaching presence in a digital learning environment. Using the Community of Inquiry framework as an analytic lens, the study explores how platform functionalities influenced instructional organization, facilitation of interaction, and direct instructional guidance.

The chapter is organized into two main sections. The first presents the outcomes of the implementation, drawing on platform analytics, instructor reflections, and student feedback to illustrate how the platform was integrated into instructional practice. The second provides a discussion of these findings, interpreting the results in relation to teaching presence, instructional coherence, and existing research on online learning design.

Rather than focusing on academic performance outcomes, the analysis examines how platform design influenced instructional practices, communication clarity, and learner engagement. By integrating behavioral data with user perspectives, this chapter provides a grounded understanding of how adaptive design can support teaching presence in authentic digital learning environments.

Outcomes of the project implementation

The pilot phase provided a comprehensive view of how the adaptive e-learning platform supported instructional organization, interaction, and feedback processes. By synthesizing platform analytics, instructor reflections, and student feedback, several key

outcomes emerged regarding teaching presence and the overall coherence of the instructional workflow.

Enhanced Course Organization and Instructional Clarity

One of the most immediate benefits of the implementation was the shift toward more transparent and organized learning pathways. The platform's modular layout and progress indicators enabled instructors to sequence content logically, making expectations clearer and more accessible.

Platform analytics revealed consistent navigation patterns across modules, suggesting that the structured design reduced uncertainty regarding task order and course progression. Instructors reported a noticeable decline in administrative queries, as students required less clarification about deadlines and activity sequences. From the student perspective, visible milestones functioned as orientation tools that reduced uncertainty often associated with digital learning environments, particularly for those less familiar with online formats. These findings support the instructional design and organization dimension of teaching presence, which depends on clear communication of learning goals and expectations.

Beyond improving navigation, the structured modular design appeared to support cognitive orientation and task prioritization. When learning pathways were visually sequenced and accompanied by progress indicators, students were better able to anticipate upcoming requirements and allocate their time accordingly. This reduction in uncertainty is particularly important in online environments where implicit cues such as verbal reminders or peer behavior are limited.

From a teaching presence perspective, the visibility of course structure functions as a form of proactive guidance. Instead of repeatedly clarifying instructions, instructors can

rely on the course architecture itself to communicate expectations. This shift allows instructional effort to move from logistical clarification toward higher-level facilitation and feedback.

These findings align with research suggesting that structured course organization reduces cognitive load and enhances learner persistence by making academic expectations transparent. In contexts where students possess varying levels of digital literacy, visible sequencing and milestone tracking may serve as essential scaffolding mechanisms that support equitable participation.

Increased Visibility of Instructor Guidance

By centralizing feedback workflows, the platform increased the visibility and accessibility of instructor guidance. System logs indicated that feedback was delivered more promptly compared with previous semesters in which instructors relied on multiple external tools.

The unified interface enabled a streamlined workflow in which rubrics, comments, and notifications were integrated directly alongside student submissions. This integration reduced the friction associated with navigating multiple platforms and supported a more consistent instructional rhythm. Students reported that embedded feedback was easier to access and apply to subsequent tasks. For instructors, the streamlined process enabled more frequent interaction without significantly increasing workload, thereby strengthening the direct instruction dimension of teaching presence.

The increased visibility of instructor feedback also contributed to a stronger perception of instructional presence. When guidance is embedded within the learning workflow, students encounter feedback as an integral part of learning rather than an external add-

on. This integration reinforces the perception that the instructor is actively monitoring progress and supporting improvement.

From an instructional standpoint, the reduction in technical friction enabled instructors to provide shorter but more frequent feedback interventions. Rather than waiting to deliver comprehensive comments at major assessment points, instructors could respond incrementally, sustaining an ongoing instructional dialogue. This pattern reflects a shift from episodic feedback toward continuous formative support.

Prior research indicates that timely feedback is a critical predictor of learner persistence and satisfaction in online learning. The current implementation suggests that platform design can influence not only the quantity of feedback but also its rhythm and integration within the learning process.

Improved Facilitation of Interaction and Discourse

The platform's facilitation tools supported a shift from minimal participation toward more structured academic discourse. When guided by prompts aligned with course objectives, students engaged in more focused and relevant exchanges. Observational notes indicated that participation tracking enabled instructors to identify less active students early in the course. This reduced reliance on manual monitoring and allowed timely interventions. Students reported that guided discussion structures clarified expectations for meaningful contributions, illustrating how digital tools can scaffold the facilitation of discourse component of teaching presence.

The guided discussion environment appeared to promote more purposeful participation by clarifying expectations for academic dialogue. When prompts were aligned with course objectives and instructors had tools to monitor engagement patterns, discussions shifted from surface-level responses toward more reflective contributions.

This suggests that meaningful online discourse does not emerge spontaneously but requires structural scaffolding. Facilitation tools functioned as extensions of the instructor's moderating role, helping sustain focus and coherence in asynchronous discussions. Such scaffolding is particularly important in large or diverse cohorts where unstructured forums may lead to fragmented interaction.

The findings reinforce the CoI model's emphasis on facilitation as a dynamic process requiring instructor presence to sustain cognitive engagement. Rather than replacing instructor moderation, the platform supported more intentional and efficient facilitation practices.

Increased Instructor Awareness Through Learning Analytics

The analytics dashboard functioned as an early indicator of engagement trends, providing instructors with a clearer view of participation patterns. Visual data on login frequency and activity completion signaled potential disengagement before academic performance was affected.

Instructor reflections suggested that these insights encouraged proactive outreach. Rather than responding only after missed assignments, instructors were able to intervene earlier when declining activity was observed. Although analytics did not replace professional judgment, they enhanced instructional monitoring and supported more timely guidance, reinforcing the monitoring and directing functions of teaching presence.

The analytics dashboard enhanced instructors' situational awareness by transforming dispersed activity data into interpretable engagement patterns. This visibility enabled instructors to recognize subtle shifts in participation that might otherwise remain unnoticed until performance declined.

Importantly, instructors emphasized that analytics served as decision-support tools rather than automated judgments. Professional judgment remained central to interpreting engagement signals and determining appropriate interventions. The dashboard's value lay in enabling earlier, more informed instructional responses. This supports emerging research suggesting that learning analytics are most effective when embedded within pedagogical workflows and interpreted by instructors rather than functioning as standalone monitoring tools.

Workflow Efficiency and Reduced Instructional Fragmentation

A recurring theme among participating faculty was the reduction of administrative workload associated with fragmented systems. Prior to implementation, instructors relied on multiple tools for grading, communication, and tracking, resulting in workflow discontinuity.

By consolidating these tasks within a single environment, the platform reduced coordination overhead and allowed instructors to devote more time to pedagogical activities. Observational data suggested fewer workflow interruptions, indicating that platform coherence is critical for sustaining teaching presence by enabling instructors to focus on instructional interaction rather than technical coordination.

Reducing fragmentation also appeared to influence instructors' cognitive workload. When routine tasks such as grading, communication, and participation monitoring were consolidated, instructors reported fewer interruptions in instructional flow. This continuity enabled sustained focus on pedagogical decision-making.

From a systems perspective, workflow coherence functions as an enabling condition for teaching presence. If instructional tasks are dispersed across multiple platforms, the

cognitive burden of coordination may reduce the time and attention available for facilitation and feedback.

These observations suggest that teaching presence is not solely a pedagogical attribute but is partially dependent on infrastructural efficiency. Platform coherence may therefore be a prerequisite for sustaining consistent instructional engagement in digital environments.

Student Perceptions of Clarity, Support, and Engagement

Student feedback indicated a shift in perceived instructional support and course clarity. Learners reported that the platform made instructor guidance more visible and accessible.

The combination of structured learning pathways and interactive elements contributed to a more engaging environment. Many students valued the ability to monitor their own progress, noting that interface clarity reduced stress associated with managing coursework. These responses suggest that design decisions influenced the perceived human presence and support within the course.

Student perceptions further illustrate the relational dimension of teaching presence. When instructional guidance is embedded within the learning environment and progress indicators provide continuous orientation, students may interpret the course as more supportive and structured.

Several students indicated that the clarity of the interface reduced anxiety associated with managing deadlines and expectations. This suggests that instructional clarity contributes not only to cognitive engagement but also to emotional reassurance, an often-overlooked dimension of online learning.

These findings align with research linking perceived instructor presence to student confidence and persistence. The platform's design appears to influence not only instructional efficiency but also learners' affective experience of the course.

Adaptive Features and Personalized Learning Navigation

Adaptive navigation tools supported a more personalized learning experience by allowing students to progress based on task completion and readiness. Instructors reported that visibility into individual progress helped identify points where students encountered difficulty.

Students valued the autonomy provided by progress tracking and milestone visibility, which supported self-regulation. In this context, adaptive features complemented rather than replaced instructor guidance by reinforcing structured pathways and enabling targeted instructional support.

The adaptive navigation features also supported differentiated instructional awareness. By visualizing individual progress patterns, instructors were able to identify where learners diverged from expected trajectories. This visibility supported targeted guidance rather than generalized reminders.

Students' ability to track their own progression promoted self-regulated learning behaviors, including pacing adjustments and task prioritization. Adaptive navigation therefore functioned as a metacognitive support tool rather than merely a personalization mechanism.

Importantly, the findings suggest that adaptive features strengthen teaching presence when they enhance instructor insight and student self-monitoring. When automation operates transparently and remains aligned with instructor oversight, it complements rather than diminishes the human dimension of teaching.

Summary of Implementation Outcomes

Overall, the pilot implementation demonstrated that platform design is closely linked to the enactment of teaching presence. The integration of structured course organization, streamlined feedback workflows, guided interaction tools, and actionable analytics contributed to a more coherent instructional environment. These outcomes suggest that when digital systems are designed to make instructional processes visible and manageable, engagement and instructional clarity in online learning environments can be significantly strengthened.

Table 2

Summary Of Instructional Improvements Observed During Platform Implementation

Aspect	Before Platform	After Platform
Course Organization	Fragmented	Structured & modular
Feedback Delivery	Delayed	Integrated & continuous
Student Engagement	Inconsistent	More active & guided
Instructor Monitoring	Reactive	Proactive (analytics-based)
Workflow Efficiency	Multiple tools	Unified platform

Table 1 summarizes the key improvements observed in instructional organization, feedback delivery, and overall workflow efficiency following platform implementation

Table 3

Platform Features Supporting Teaching Presence Dimensions

Teaching Presence Dimension	Supporting Platform Features
Instructional Design	Modular structure, learning pathways
Facilitation of Discourse	Discussion tools, participation tracking
Direct Instruction	Feedback workflows, notifications
Monitoring & Guidance	Analytics dashboard, engagement indicators

Table 2 illustrates how specific platform features were aligned with the core dimensions of teaching presence within the Community of Inquiry framework.

Discussion of the findings

The pilot phase offers a clear view of how the designed platform architecture does more than simply host instructional materials; it actively supports the enactment of teaching presence. When examined through the Community of Inquiry (CoI) framework, the findings indicate that instructional clarity, workflow coherence, and the visibility of guidance are not peripheral conveniences but core conditions for sustaining meaningful engagement. In this sense, the platform functioned not merely as a technological tool but as an instructional infrastructure that organized and supported the learning process.

Rather than viewing teaching presence solely as an individual instructor behavior, the results suggest that it emerges from the interaction between pedagogical intent and system design. When instructional workflows are embedded within the platform architecture, the instructor's guidance becomes structurally visible, consistent, and sustainable.

While the integration of course organization, feedback, discussion, and analytics features strengthens instructional coherence, it may also introduce complexity for instructors who are less familiar with digital platforms. This suggests that effective platform design must balance functional richness with usability. In this context, support mechanisms such as preconfigured templates, guided onboarding, and simplified workflows are important for ensuring that integrated systems reduce rather than unintentionally increase instructional burden.

Teaching presence as an organizing structure

The improvements observed in course organization reinforce the understanding of teaching presence as the structural foundation of online learning. Through structured modules and visible progress indicators, instructors were able to externalize their pedagogical intentions. Expectations that might otherwise require repeated clarification were embedded directly into the learning environment.

This shift is significant. Instead of relying on reactive communication to clarify requirements, instructors could embed direction within the course architecture itself. As a result, instructional effort was redirected toward facilitation and feedback rather than logistical troubleshooting. The platform thus enabled a proactive form of teaching presence, where guidance was built into the learning pathway rather than delivered only in response to confusion.

These findings align with research suggesting that clear course structure enhances learner orientation, reduces ambiguity, and strengthens engagement. When sequence and expectations are transparent, students expend less cognitive energy deciphering logistics and can focus more fully on learning tasks.

Instructional clarity and cognitive load reduction

Beyond improving navigation, the structured layout appeared to provide students with cognitive orientation in an environment where physical cues are absent. In face-to-face classrooms, verbal reminders, peer behavior, and routine patterns help students anticipate expectations. In digital environments, these cues are limited, making explicit sequencing essential.

This outcome resonates strongly with Cognitive Load Theory. By visually mapping course progression and clarifying expectations, the platform reduced extraneous cognitive load and supported more efficient allocation of mental resources. Students were better able to anticipate tasks, plan their time, and maintain focus on comprehension and problem-solving.

Importantly, this clarity functioned as an equity-support mechanism. Students with varying levels of digital literacy or academic preparedness benefited from the structured environment, which reduced uncertainty and supported self-regulation. In heterogeneous cohorts, such scaffolding can help narrow performance gaps by ensuring that expectations are accessible and transparent to all learners.

Visibility of guidance and direct instruction

One of the most tangible outcomes of the pilot was the increased visibility of instructor guidance. Integrated feedback workflows positioned rubrics, comments, and

notifications directly alongside student work, reducing the separation between instruction and application.

Students reported that contextualized feedback supported continuity of learning, enabling them to revisit guidance and apply it to subsequent tasks. This suggests that feedback effectiveness is influenced not only by content but also by accessibility and placement within the learning environment.

The findings further indicate that responsiveness is not solely a matter of instructor effort but is influenced by system design. When technical friction is reduced, instructors can provide feedback more consistently without increasing workload. This contributes to a sustainable rhythm of direct instruction, reinforcing teaching presence through timely and visible guidance.

Facilitation of discourse and meaningful interaction

The pilot also confirmed that meaningful interaction requires intentional facilitation. Participation tracking and objective-aligned prompts helped shift student contributions from minimal participation toward focused academic discourse.

These findings support the CoI premise that social interaction alone does not ensure learning. Interaction must be guided toward inquiry and knowledge construction. By enabling instructors to identify less active participants early, the platform supported inclusive facilitation and timely outreach.

Importantly, these tools did not replace the instructor's role in guiding discussion; rather, they provided the visibility needed to support intentional facilitation. This distinction underscores that technology can enhance instructional awareness while preserving the human dimension of discourse.

Instructor awareness and data-informed guidance

The analytics dashboard functioned as an early awareness mechanism, offering insight into participation patterns and engagement trends. By monitoring activity levels and completion rates, instructors could identify potential disengagement before academic performance declined.

This shift from reactive to proactive intervention strengthens the monitoring dimension of teaching presence. Instead of responding to missed deadlines, instructors could initiate supportive communication when engagement patterns changed.

However, the findings also highlight the importance of pedagogical interpretation. Analytics provide indicators rather than explanations. Their value lies in supporting professional judgment, not replacing it. Effective use therefore depends on instructors' ability to interpret data within the broader instructional context.

Workflow coherence and sustainability of teaching presence

A recurring theme throughout the pilot was the reduction in workflow fragmentation. Transitioning from multiple disconnected tools to a unified environment significantly improved instructional flow.

Fragmented systems impose hidden cognitive and administrative costs. They require instructors to manage coordination tasks that divert attention from pedagogical engagement. By consolidating communication, feedback, and monitoring processes, the platform allowed instructors to allocate more time and cognitive resources to facilitation and guidance.

These findings suggest that the sustainability of teaching presence is not only a pedagogical issue but also an infrastructural one. When workflows are coherent,

instructors can maintain consistent presence without experiencing administrative overload.

Student experience: clarity, support, and perceived presence

From the student perspective, the platform design influenced their perception of support and instructor accessibility. Structured pathways and progress indicators reduced the uncertainty associated with self-managed online learning.

This increased sense of clarity contributed to feelings of competence and autonomy, aligning with Self-Determination Theory. When learners understand expectations and can monitor their progress, motivation and persistence tend to improve. The instructor's guidance becomes more visible, reinforcing the perception of an active teaching presence.

The findings suggest that perceived instructor presence is shaped not only by direct communication but also by the clarity and responsiveness embedded within the learning environment.

Adaptive Features and the Human Dimension of Instruction

The adaptive navigation features provided personalized progress visibility without diminishing the instructor's role. Instead of automating teaching functions, these tools enabled more targeted support.

By highlighting individual progress patterns, the platform helped instructors identify specific points of difficulty and provide relevant guidance. Students reported that progress-based navigation supported self-regulation and planning.

These findings challenge concerns that adaptive technologies reduce human interaction. When integrated thoughtfully, adaptive tools can strengthen teaching presence by supporting timely and personalized guidance.

Equity, Accessibility, and Inclusive Participation

An additional implication of the findings relates to inclusive participation. Structured organization, clear navigation, and flexible access options supported diverse learning needs. When expectations are transparent and content is accessible in multiple formats, barriers to participation are reduced.

From a Universal Design for Learning perspective, these features promote equitable access and engagement. In resource-variable contexts, such design considerations are essential for ensuring that digital learning environments support diverse learners rather than reproducing inequities.

Institutional and pedagogical implications

The findings suggest that effective digital learning requires alignment between technological systems and pedagogical workflows. Institutions that prioritize integrated platforms may reduce instructor workload while improving instructional coherence. Professional development also emerges as a critical factor. Instructors benefit not only from technical tools but from training that supports facilitation strategies, feedback practices, and data-informed decision-making. Without such support, the potential benefits of integrated platforms may remain underutilized.

These implications extend beyond individual courses to institutional planning and policy development.

Contextual relevance in resource-variable environments

The results are particularly relevant in contexts characterized by infrastructural variability and resource constraints. In such environments, coherent platform design can serve as a stabilizing element that supports engagement and instructional continuity. When external conditions create uncertainty, clarity and consistency within the learning environment become even more important. Integrated systems can therefore play a critical role in sustaining teaching presence and learner engagement.

Reframing teaching presence as system-supported practice

Overall, the findings reinforce a shift in understanding teaching presence as both pedagogical and infrastructural. While instructor expertise remains essential, system design influences how consistently teaching presence can be enacted.

This perspective reframes digital learning environments not as neutral delivery channels but as active participants in instructional practice. When platforms support coherent workflows and visible guidance, teaching presence becomes more sustainable, scalable, and impactful.

CHAPTER 5
CONCLUSIONS

Summary of findings

This study examined the design of an adaptive e-learning platform intended to strengthen teaching presence in online learning environments. Guided by the Community of Inquiry (CoI) framework, the research explored how specific platform features supported instructional design, the facilitation of interaction, and the delivery of instructor guidance. Using a design-based research methodology, the platform was implemented in a pilot phase and evaluated through several data sources, including platform analytics, instructor reflections, and student feedback. The findings suggest that purposeful platform design can support teaching presence by making instructional workflows clearer and more organized within the digital learning environment.

One of the most significant outcomes observed during the pilot was the improvement in course organization and instructional clarity. Through the use of modular layouts, clearly defined learning pathways, and visible progress indicators, instructors were able to sequence course materials more coherently. This structured design helped reduce confusion about assignments, deadlines, and task progression. Platform analytics showed consistent navigation patterns across course modules, and instructors reported a noticeable decline in administrative questions from students. For learners, the clear sequencing of activities and milestone tracking provided a more stable framework for navigating course requirements. These findings align with the instructional design and organization component of the Community of Inquiry framework, demonstrating how structured course architecture can communicate expectations more effectively.

The study also found that the platform improved the visibility of instructor guidance through integrated feedback workflows. By combining grading rubrics, instructor comments, and automated notifications within the submission interface, the platform reduced the need for instructors to use multiple external tools. This integration simplified the feedback process and allowed instructors to provide guidance more consistently. Platform logs showed an increase in feedback activity, while students reported that embedded feedback was easier to access and apply in later assignments. As a result, instructor feedback became a more visible and continuous part of the learning process, strengthening the direct instruction dimension of teaching presence.

Another important outcome was the improvement in the facilitation of student interaction. The platform's discussion management tools, together with participation tracking features, helped instructors guide online discussions more effectively. Structured discussion prompts connected to course objectives encouraged students to contribute more meaningful responses. Participation data also allowed instructors to identify less active students early and encourage greater involvement. These findings suggest that digital facilitation tools can support the facilitation of discourse component of teaching presence by enabling instructors to maintain focused and inclusive interaction within asynchronous learning environments.

The integration of learning analytics further enhanced instructor awareness of student engagement patterns. The platform's analytics dashboard provided information about login frequency, activity completion, and participation levels. This allowed instructors to monitor engagement trends and recognize early signs of disengagement. Instead of responding only after missed assignments or declining performance, instructors could intervene earlier when participation patterns changed. Instructor reflections indicated

that analytics served primarily as decision-support tools that helped instructors interpret engagement data while maintaining professional judgment. In this way, the platform strengthened the monitoring and guidance aspects of teaching presence.

Another key finding was the improvement in instructional workflow efficiency. Before the pilot implementation, instructors frequently relied on multiple separate tools for communication, grading, and student monitoring. The integration of these functions within a single platform reduced administrative complexity and streamlined routine instructional tasks. Observational notes suggested that instructors experienced fewer interruptions in their workflow, allowing them to focus more on facilitation and feedback. These results highlight the importance of coherent platform design in supporting the sustainability of teaching presence by reducing technical fragmentation.

Student feedback also confirmed improvements in perceived instructional support. Learners reported that the platform's organized interface and integrated communication features made instructor guidance more visible and accessible. Many students indicated that the clarity of the platform reduced stress related to managing assignments and deadlines. The progress indicators also encouraged self-regulated learning by allowing students to monitor their own progress throughout the course. These responses suggest that platform design can influence not only instructional efficiency but also students' sense of support and engagement within the learning environment.

Finally, the adaptive navigation features contributed to a more personalized learning experience. Students were able to progress through course materials based on task completion and readiness, while instructors maintained visibility into individual progress patterns. This allowed instructors to identify where students encountered difficulties and provide targeted guidance. Rather than replacing instructor involvement,

the adaptive features complemented teaching presence by supporting both instructor awareness and learner self-regulation.

Overall, the findings of the pilot implementation suggest that adaptive e-learning platforms can enhance teaching presence when they integrate structured course organization, efficient feedback workflows, facilitation tools for interaction, and learning analytics that support instructor awareness. By embedding these instructional processes within a unified digital environment, the platform enabled instructors to guide learning more effectively and maintain consistent engagement throughout the course. These results highlight the importance of aligning technological development with pedagogical frameworks so that digital learning environments actively support effective teaching practices.

Limitations of the Project

While this project provides useful insights into how adaptive platform design can support teaching presence in online learning environments, several limitations should be acknowledged. Recognizing these limitations helps define the scope of the findings and places the results within their proper context.

One limitation concerns the scale and duration of the pilot implementation. The platform was tested within a limited instructional context and over a relatively short period. As a result, the findings mainly reflect early experiences with the platform rather than long-term patterns of use. A longer implementation across multiple semesters would provide a clearer understanding of how continued use of the platform influences instructional practices, engagement, and adoption over time.

A second limitation relates to the size and scope of the participant group. The pilot involved a limited number of instructors and students within a specific educational

setting. For this reason, the findings may not fully represent the range of teaching practices and learner experiences found across different disciplines, institutions, or educational levels. Since online teaching is shaped by context, class size, and institutional resources, broader implementation would be needed to examine how the platform functions in more diverse settings.

Another limitation is linked to the evaluation focus of the study. The project examined instructional practices, system usability, and perceived engagement rather than direct academic outcomes such as grades or standardized assessments. This focus was appropriate for a design-based study centered on teaching presence, but it means that the study does not provide conclusive evidence about the platform's effect on academic achievement. Future research could combine the present design-oriented approach with outcome-based measures to better assess educational impact.

Another limitation concerns the potential complexity associated with integrated feature-rich platforms. Although the system was designed to improve instructional coherence, the inclusion of multiple modules such as analytics, discussion tools, and feedback workflows may require additional orientation and support for instructors with limited digital literacy. Future refinement should therefore continue to prioritize interface simplicity, guided use, and training support.

The study also relied partly on self-reported data from instructors and students. Instructor reflections and student feedback were valuable in understanding usability and perceived support, but such responses may be influenced by personal expectations, previous experience with online platforms, or the novelty of using a new system. Although these perspectives were supported by analytics and observational notes,

additional methods such as structured interviews or longer-term studies could provide a more comprehensive picture of user experience.

Technical limitations should also be noted. The platform was developed as a research-based prototype intended to demonstrate design principles that support teaching presence. It was not designed as a full institutional learning management system. Features such as extensive system integration, large-scale deployment capacity, and advanced institutional infrastructure were beyond the scope of this project. The platform should therefore be understood as a proof of concept rather than a complete replacement for existing institutional systems.

Finally, the study was conducted within a specific institutional and regional context. Differences in infrastructure, digital readiness, and institutional policy may affect how easily similar platforms can be implemented in other settings. Further testing in varied educational and cultural contexts would help determine the broader applicability of the design approach.

Despite these limitations, the project makes a meaningful contribution by showing how platform design can be aligned with pedagogical theory to support teaching presence. It provides a useful foundation for future development and research on coherent digital learning environments that integrate course organization, feedback, facilitation, and analytics.

Recommendations

Based on the findings of this project, several recommendations can be made for educational practice, platform development, and future research. These recommendations aim to support the continued improvement of online learning

environments and to guide institutions and researchers interested in strengthening teaching presence through intentional platform design.

First, educational institutions should prioritize the use of integrated digital platforms rather than relying on multiple disconnected tools. The findings of this study suggest that teaching presence is better supported when course organization, feedback mechanisms, facilitation tools, and learning analytics are brought together within a single environment. Institutions seeking to improve the quality of online learning should therefore invest in systems that make instructional work more coherent, visible, and manageable for instructors.

Second, platform developers should continue to design online learning systems around clear pedagogical principles rather than focusing only on technical functionality. This study showed that features such as modular course organization, visible learning pathways, embedded feedback tools, participation tracking, and analytics dashboards can directly support the main dimensions of teaching presence. Future platform development should maintain strong alignment with the Community of Inquiry framework, while also drawing on complementary theories such as Universal Design for Learning and Cognitive Load Theory.

Third, instructors should be supported through professional development that helps them use digital platforms as active teaching environments rather than simple content repositories. The platform was most effective when its tools were used intentionally to organize learning, guide interaction, and provide timely support. Training programs should therefore focus on helping instructors design clear learning pathways, facilitate meaningful discussion, interpret student engagement data, and use feedback tools effectively in online and blended settings.

Fourth, future research should examine the platform in broader and more diverse educational contexts. Since this study was conducted within a limited pilot setting, additional implementation across different institutions, disciplines, and educational levels would provide stronger evidence about the adaptability of the design. Longer-term studies would also help clarify how sustained platform use influences teaching practices, student engagement, and instructional routines over time.

Fifth, future studies should consider including direct measures of academic performance in addition to process-based indicators. While the present project appropriately focused on teaching presence, usability, and instructional practices, combining these dimensions with measures such as achievement, course completion, or comparative performance data would provide a more comprehensive understanding of the platform's educational impact.

Finally, future development of the platform should prioritize features that reduce instructor burden and support adoption across different levels of digital readiness. These may include default course templates, guided onboarding processes, embedded help features, and automated or semi-automated feedback suggestions. Such additions would help ensure that the pedagogical benefits of integration do not come at the cost of increased complexity for instructors.

Overall, the findings of this project suggest that strengthening teaching presence in online learning environments requires more than access to digital tools alone. It requires platforms that are intentionally designed to support instructional practice, learner clarity, and meaningful engagement. These recommendations are intended to guide future efforts in designing and implementing more coherent and pedagogically grounded digital learning environments.

REFERENCES

Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks, 12*(3), 3–22.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1–17.

Arbaugh, J. B., & Hwang, A. (2006). Does "teaching presence" exist in online MBA courses? *The Internet and Higher Education, 9*(1), 9–21. https://doi.org/10.1016/j.iheduc.2005.12.001

CAST. (2024). *CAST Universal Design for Learning Guidelines version 3.0*. https://udlguidelines.cast.org/

Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher, 32*(1), 5–8.

Fiock, H. S. (2020). Designing a Community of Inquiry in online courses. *The International Review of Research in Open and Distributed Learning, 21*(1), 134–152. https://doi.org/10.19173/irrodl.v20i5.3985

Garrison, D. R. (2017). *E-learning in the 21st century: A community of inquiry framework for research and practice* (3rd ed.). Routledge.

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education, 10*(3), 157–172. https://doi.org/10.1016/j.iheduc.2007.04.001

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education, 15*(1), 7–23. https://doi.org/10.1080/08923640109527071

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education, 19*(3), 133–148. https://doi.org/10.1207/s15389286ajde1903_2

Li, W., & Wang, W. (2024). The impact of teaching presence on students' online learning experience: Evidence from 334 Chinese universities during the pandemic. *Frontiers in Psychology, 15*, Article 1291341. https://doi.org/10.3389/fpsyg.2024.1291341

Lockman, A. S., & Schirmer, B. R. (2020). Online instruction in higher education: Promising, research-based, and evidence-based practices. *Journal of Education and e-Learning Research, 7*(2), 130–152.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. U.S. Department of Education. https://www.ed.gov/media/document/evaluation-of-evidence-based-practices-online-learning-meta-analysis-and-review-of-online-learning-studies-revised-september-2010-107159.pdf

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 14*(2), 50–71.

Rovai, A. P. (2002). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning, 3*(1). https://doi.org/10.19173/irrodl.v3i1.79

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*(2), 257–285. https://doi.org/10.1207/s15516709cog1202_4

Zgheib, G., Al Daia, R., & Serhan, M. (2023). A contextual approach for exploring faculty readiness to teach online. *Heliyon, 9*(10), Article e20491. https://doi.org/10.1016/j.heliyon.2023.e20491